

Energy

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CHAPTER

1

Energy

- Define energy.
- Give the SI unit for energy.
- Identify different forms of energy.



These young children are very active. They seem to be brimming with energy. You probably know that lots of things have energy—from batteries to the sun. But do you know what energy is? Read on to find out.

Defining Energy

Energy is defined in science as the ability to move matter or change matter in some other way. Energy can also be defined as the ability to do work, which means using force to move an object over a distance. When work is done, energy is transferred from one object to another. For example, when the boy in the **Figure 1.1** uses force to swing the racket, he transfers some of his energy to the racket.

Q: It takes energy to play tennis. Where does this boy get his energy?

A: He gets energy from the food he eats.

SI Unit for Energy

Because energy is the ability to do work, it is expressed in the same unit that is used for work. The SI unit for both work and energy is the joule (J), or Newton • meter ($\text{N} \cdot \text{m}$). One joule is the amount of energy needed to apply a force of 1 Newton over a distance of 1 meter. For example, suppose the boy in the **Figure 1.1** applies 20 Newtons of force to his tennis racket over a distance of 1 meter. The energy needed to do this work is $20 \text{ N} \cdot \text{m}$, or 20 J.



FIGURE 1.1

Energy Has Many Forms

If you think about different sources of energy—such as batteries and the sun—you probably realize that energy can take different forms. For example, when the boy swings his tennis racket, the energy of the moving racket is an example of mechanical energy. To move his racket, the boy needs energy stored in food, which is an example of chemical energy. Other forms of energy include electrical, thermal, light, and sound energy. The different forms of energy can also be classified as either kinetic energy or potential energy. Kinetic energy is the energy of moving matter. Potential energy is energy that is stored in matter. You can learn more about the different forms of energy at this URL: http://www.eia.gov/kids/energy.cfm?page=about_forms_of_energy-basics

For an animation showing the different forms of energy used to ride a bike, go to this URL: <http://www.childrens.university.manchester.ac.uk/interactives/science/energy/what-is-energy/>

Q: Is the chemical energy in food kinetic energy or potential energy?

A: The chemical energy in food is potential energy. It is stored in the chemical bonds that make up food molecules. The stored energy is released when we digest food. Then we can use it for many purposes, such as moving (mechanical energy) or staying warm (thermal energy).

Q: What is an example of kinetic energy?

A: Anything that is moving has kinetic energy. An example is a moving tennis racket.

Summary

- Energy is defined in science as the ability to move matter or change matter in some other way. Energy can also be defined as the ability to do work.
- The SI unit for energy as well as work is the joule (J), or Newton • meter (N • m).
- Energy exists in different forms, such as mechanical energy and chemical energy. Most forms of energy can also be classified as either kinetic energy or potential energy.

Explore More

At the following URL, unscramble the letters to identify different forms of energy. <http://www.learnaboutenergy.org/projects/energypuzzles/puzzle4.html>

Review

1. How is energy defined in science?
2. What is the SI unit for energy?
3. Name two forms that energy may take.
4. Which type of energy is the energy of a moving tennis ball? Is it kinetic energy or potential energy?

References

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